BattleBot Rules Fall 2002

Each team in this semester’s competition will be issued one RC car for use in all three events. All RC cars are identical in every way. These will be referred to as the “platform”, upon which you will base your design. Each team is expected to design three different covers or attachments for each of the three events listed below:

**General Rule #0**: No designs may be employed that are unsafe. Safety must be consideration #1 for all designs

**General Rule #1**: Do not modify the remote control car chassis. Use clamps and other fixtures to attach the devices externally to the platform. This allows us to easily replace the platform during the competition if there are any device failures.

**EVENT ONE: TRACTOR PULL**

In this event the competitors will be required to move a heavy container a distance of one foot across concrete. The container (a large plastic trash can) will have a holding capacity of approximately 30 gallons. The container + water will have a weight of ~100 lbs. The winning team will move the filled container a distance not less than 1 foot in the minimum amount of time. Time will be measured from when the container begins moving until the container has been moved 1 foot. The vehicle platform should not be modified in any way (such as removal of the motor). No power sources external to the platform may be used, but energy storage and recovery systems may be employed (such as compliant mechanical elements).

Teams will need to design a mechanism to move the container, since it will be far too heavy to move by simply dragging it behind the platform. The use of external fixation devices, such as posts in the ground, is permitted. However, no outside forces other than that of the original RC car platform may be used in the aid to move the container. The container will start at rest and be pulled over a concrete surface (a sidewalk outside the blue lounge). You may not modify the surface on which the container is pulled, nor may you lift or roll the container in any way. The container must be dragged over the surface in its original orientation.

**EVENT TWO: TRANSPORTATION OF OPEN WATER CONTAINER**

Outside the blue lounge are three cement benches that form a 90 degree angle with one another. There will be a ramp leading up to the first bench set at approximately a 20 degree angle. There will be two bridges linking the three benches together, followed by the last ramp leading back down to ground, also at a 20 degree angle. There will then be a set of 4 speed bumps consisting of stationary 1” by 4” boards. The trailer is to hold a regular party cup from the store that will be filled with water (supplied by John Melchoir, see below). The objective of this event is to design a trailer for the RC car platform that will minimize the amount of water spilled when running through the obstacle course. It is required that the design be on a trailer behind the RC car in order to prevent water damage to the internal electronics of the platform. Your design must also allow an unmodified cup to be placed into and easily removed from the trailer.
One bot will run this course at a time. Upon completion of the obstacle course the cup will be removed from the trailer and the water remaining in the party cup will be emptied into a graduated cylinder in order to measure the amount lost throughout the obstacle course. The course is purposely not designed to be flush at meeting points where the ramps and bridges meet the bench. There will be several small speed bumps throughout the obstacle course. The winner will be the team that has the most water remaining in the cup at the end of the course.

**General Guidelines for Events 1 & 2:** These are simplified tasks that are meant to emphasize the ability of the design team to design for maximum power transmission (event#1), and to design for dynamics and control (event #2). To retain the initial intent of this event, no “clever cheats” will be permitted that defeat the purpose of the event. Examples of clever cheats (that are not permitted) include, but are not limited to:

**Event 1—**
- Modifying the surface on which the container is dragged to reduce friction
- Lifting or rolling the container
- Using external power to move the container

**Event 2—**
- Freezing the water in the cup, or otherwise changing the phase or viscosity
- Raising the walls of the cup to minimize spillage
- Covering or capping the cup
- Catching and replacing spilled water
- Transferring the water to a different container for transport

**EVENT THREE: KING OF THE RING**
Competitors will all enter an elevated 8’ by 8’ ring, approximately 4” elevation above ground. The teams will design some kind of ramming or weaponry system in order to force the other team off the ring on to the ground where they will not be able to re-enter the ring. The car must be completely off of the surface of the battle arena before being considered knocked out. The object in this event is to be the last bot standing in the arena. Winner will be decided by best 3 out of 5 knockouts.

**OPTIONAL: EVENT FOUR: PIT of DEATH**
If both teams agree to this competition prior to the match, the bots will be placed in a restricted arena and allowed to battle it out until one bot has been disabled or destroyed. The bot that has not been flipped, crushed, or reduced to a pile of smoldering ash will be declared the winner.

*During the design process the teams may study the fixtures that will be used during each event. Teams can contact John Melchior jmelchio@engin.umich.edu for access to the materials.*